

REMARKS

Reconsideration and withdrawal of the rejections set forth in the Office Action are respectfully requested in view of this amendment and the following reasons. By this amendment, claims 1, 9, and 12-15 have been amended, and new claims 16 and 17 have been inserted. Accordingly, claims 1-17 are pending in this application.

Claims 1, 9, and 12-15 have been amended to recite the subject matter more clearly or correct informalities to overcome the stated objection and ground for rejection.

The new claims include claims 16 and 17 dependent from claims 13 and 14, respectively, and reciting the features deleted from claims 13 and 14.

It is respectfully submitted that the above amendments introduce no new matter within the meaning of 35 U.S.C. §132.

Entry of the Amendment is proper under 37 C.F.R. §1.111 because it places the application in *prima facie* condition for allowance for the reasons discussed herein. For at least these reasons, entry of the present Amendment is therefore respectfully requested. Accordingly, Applicant requests reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

Specification Objection

Abstract

The abstract of the disclosure is objected to as allegedly not being in the form of a single paragraph free of extraneous material. Applicant believes that the abstract of the disclosure meets the requirements of MPEP §608.01(b) as well as MPEP §1826. Accordingly, Applicant respectfully requests withdrawal of the objection to the abstract.

Brief Description of the Drawings

The disclosure is objected to because of the following informalities: The specification lacks a section entitled “Brief Description of the Drawings.” Applicant submits that, in

compliance with the Examiner's suggestion, the disclosure has been amended. Accordingly, Applicant respectfully requests withdrawal of the objection to the disclosure.

Rejections Under 35 U.S.C. §112

Claims 9 and 12-15 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to Claim 9

The Examiner points out that the term "these shapes" in claim 9 is unclear.

Applicant respectfully submits that this ground for rejection has been overcome by the amendment to claim 9 where "these shapes" was replaced by-- two or more of the straight, corrugated, ribbed, and hooked shapes --.

As to Claim 12

The Examiner concludes that the term "generally plane shape" in claim 12 is a vague and indefinite as the term is a relative phrase which renders the claim indefinite.

By this amendment, the term "generally plane shape" has been deleted from claim 12 without prejudice or disclaimer.

As to Claims 13-15

The Examiner contends that claims 13-15 provide for the use of a concrete element, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass.

Claims 13-15 have been amended to exclude the use of the term "use," rather be drawn to the concrete element, a structural concrete element, and the concrete mix, respectively, which are considered to be allowable subject matters.

Applicant believes that, by this amendment, claims 9 and 12-15 become allowable. Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. §112, second paragraph rejection of claims 9 and 12-15.

Rejections Under 35 U.S.C. §101

Claims 13-15 stand rejected under 35 U.S.C. §101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. §101.

As noted above with regard to the 35 U.S.C. §112, second paragraph rejection, claims 13-15 have been amended to exclude the use of the term “use.” By this amendment, Applicant respectfully submits that claims 13-15 meet the requirements of 35 U.S.C. §101.

Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. §101 rejection of claims 13-15.

Rejections Under 35 U.S.C. §103

Claims 1-12 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over the International Patent Application Publication WO 02/18291 applied for by Over et al. (“Over ‘291”) in view of the U.S. Patent No. 5,451,471 issued to Over et al. (“Over ‘471”). The Examiner relied on the U.S. Patent Application Publication No. 2004/0050302 as the English translation of Over ‘291.

Applicant respectfully notes that the present subject matter aims at providing a fiber reinforced concrete mixture that permits the manufacture of *structural elements* such as slabs, shells, retaining walls, beams, columns, foundation slabs or rafts *without conventional reinforcement*, i.e. *without steel reinforcing bars*. In particular, the concrete mixture permits manufacturing of metal fiber reinforced concrete elements, e.g. slabs, with a slenderness ratio of greater than 20, and especially around 25 to 35, which has good reinforcement in bending and in

shear, and therefore can be used in structural application.

This is achieved by the particular selection of fibers having the prescribed diameter and aspect ratio, and in the specified amount, as recited in claim 1.

Examples of building elements from concrete reinforced with fibers only, i.e. without conventional reinforcing steel bars, are given in the description of the present application. In page 7 of the application, the casting of a flat slab in a formwork is described. The slenderness ratio can reach up to 35, which is by far greater than what was described for slabs reinforced with Twincone fibers (See, International Search Report).

As it will be shown below, unexpectedly and contrary to conventional practice, the performance of the concrete according to the subject matter is achieved with metal fibers having a *low aspect ratio* and a *larger diameter than is usual*. Furthermore, the fibers are added in substantially larger quantity than in the conventional practice.

Over '291 relates to a concrete mixture for manufacturing voussoirs, which are not structural elements.

The Examiner notes that the text prescribed that the fiber dosage is maximum 120 kg/m³ and the ratio of the fiber length to the biggest grain diameter is at least 2, preferably at least 3. This is not a criteria used in the definition for the subject matter.

In the examples in Over '291, DRAMIX RC 80-60 fibers are used. These fibers have a diameter of 0.8 mm and an aspect ratio (i.e. length over diameter) of 75. Hence, the diameter is 30% less than the presently prescribed minimum diameter and the aspect ratio is about 70% more than the presently prescribed maximum value (45). Furthermore, in contrast to the present subject matter, Over '291 does not disclose, teach, or suggest "an aspect ratio of between 35 and 45." Rather, Over '291 discloses a different aspect ratio of 75, which does not fall within the claimed range.

Finally, claim 7 of Over '291 prescribes a preferred amount of fibers in the range of 40 to 100 kg/m³, whereas the presently prescribed fiber amount is of at least 80 kg/m³, and preferably between 80 and 180 kg/m³, so that the prescribed upper limit is far above the upper limit recited in claim 7 of Over '291.

As a result, the reinforcing fiber requirements for use in the present concrete mix are clearly different from those of Over '291, and there is absolutely no incentive from that document to select the prescribed reinforcing fibers.

Furthermore, a person skilled in the art having a desire to develop a new concrete mixture for structural elements without reinforcing bars would not have turned to Over '291 since the concrete described therein is for the construction of voussoirs, i.e. reduced dimension elements cast in a production plant and installed/mounted on site after hardening. In that respect, claim 18 mentions elements of reduced dimensions such as tiles, plate elements or shell elements. In contrast, the concrete mixture of the invention has been designed for being *able to be pumped and cast in situ*, for building *structural* concrete elements such as flat slabs.

A last remark about Over '291 is that it concerns a highly resistant and ductile fiber concrete, which has very specific constituents and complex mixing protocol. Such concrete is comparable to the High Performance concrete described in WO 95/01316, and acknowledged in the introductory part of the present application, however being inappropriate for the manufacturing of slender structural elements.

According to the Examiner, since Over '291 indicates the use of fibers having a ratio of the fiber length to the biggest grain diameter that is at least 2, preferably of at least 3, a skilled person would naturally select the claimed fibers in view of Over '471.

Applicant respectfully disagrees.

Again, Over '471 discloses a concrete mix that permits the construction of flat slabs and other structural elements *without re-bars*, and having a *high slenderness ratio*.

Over '471 proposes a reinforcement fiber that is designed to avoid pulling out of the concrete. It teaches a particular shape of fibers, however, is absolutely silent about the dosage. It seems also silent about the field of application, and it does not precise whether such fibers could be used as sole reinforcement, i.e. without re-bars, in structural concrete elements.

Having designed a fiber with a given shape, the authors of Over '471 have attempted to maximize the scope of their patent having regard to the fiber dimensions. Hence, to back-up claim 6, Over '471 teaches in Col. 1, lines 14-21 that it is conventional to use fibers having a

length between 10 and 70 mm, a diameter between 0.4 and 2 mm and an aspect ratio between 30 and 80.

Applicant does not contest that fibers having various lengths, diameters and shapes are known from the prior art as a whole.

However, as it will certainly be appreciated by the Examiner, certain features of fibers may be selected, in a predetermined amount, from a variety of known fibers, in order to achieve a certain goal. Applicant respectfully asserts that it is not obvious to combine the features of known fibers to achieve the goal noted above.

The values given in Over '471, Col. 1 are *extremely broad* and there is no indication to opt for one particular length or diameter. In Col. 1, lines 15-16, one can read that it is preferable to use fibers having a length to thickness ratio as great as possible.

However, the Inventors have selected fibers having an aspect ratio lying between 35 and 45, which is a narrow selection within the broad range of 30 to 80 as taught by Over '471.

In contrast to the presently claimed subject matter, the cited prior art does not disclose, teach, or suggest "an aspect ratio of between 35 and 45." Furthermore, the "aspect ratio of between 35 and 45" is not within the higher range portion of Over '471, contrary to the statement in Col. 1, line 16 thereof.

As explained in the present application, the performance of the concrete element according the subject matter is achieved with metal fibers having a *low* aspect ratio and *larger* diameter than is usual. Furthermore, the fibers are added in substantially larger quantity than in the customary practice.

Accordingly, the Inventors have *unexpectedly* (because this is contrary to the conventional practice) been able to design a concrete mixture allowing the construction of slender structural elements of high slenderness ratio *without* re-bars.

Neither Over '291 nor Over '471 addresses this issue or provides a motivation to combine each other.

Claims 1-12 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over

the U.S. Patent issued to Givens (“Givens”).

Givens discloses an extremely broad range of length and diameter values (Col. 1), and also, an aspect ratio varying from *40 to 300* (Col. 5, line 46).

Applicant submits that a skilled artisan would not have been incited to select the aspect ratio between 35 and 45 based on such broad statement of Givens.

Applicant further submits that a skilled artisan would not have been led to the subject matter from Givens because Givens teaches what the subject matter aims to *avoid*: concrete structural members combining fibers (in upper slab region) and reinforcing bars (in lower slab region). Moreover, Givens is silent about the amount of fibers. Finally, Givens, as recited in its claim 5, teaches fibers having a diameter between 0.152 and 0.508 mm, i.e. which is substantially below the diameter of the fibers required by the subject matter.

Hence, Givens teaches away from the present subject matter since it illustrates the necessity for a floor slab to include reinforcing bars even when fiber reinforced concrete is employed. Figs. 1, 2, and 3 as well as Tables I and V indicate diameter No. 5 and spacing (inches). Furthermore, the Examiner will certainly appreciate that the maximum distance is 7 ft. 11ins. (i.e. 2.42 m) for a thickness of 8.5 ins. (i.e. 216 mm) and thus a slenderness ratio of 11.02 whereas the present concrete mixture allows manufacture of flat slabs with a slenderness ratio as high as 35. There is no way that a skilled artisan can be led from Givens to a fiber reinforced concrete mix composition according to claim 1 of present application, which allows the construction of structural elements with fiber reinforcement only, and of high slenderness.

Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. §103(a) rejection of claims 1-12. Since none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features of the claimed subject matter, Applicant respectfully submits that independent claim 1, and all the claims that depend therefrom, are allowable.

New Claims

New claims 16 and 17 are allowable at least because they introduce no new matter and depend upon allowable claims 13 and 14, respectively.

CONCLUSION

Applicant believes that a full and complete response has been made to the pending Office Action and respectfully submits that all of the stated objections and grounds for rejection have been overcome or rendered moot. Accordingly, Applicant respectfully submits that all pending claims are allowable and that the application is in condition for allowance.

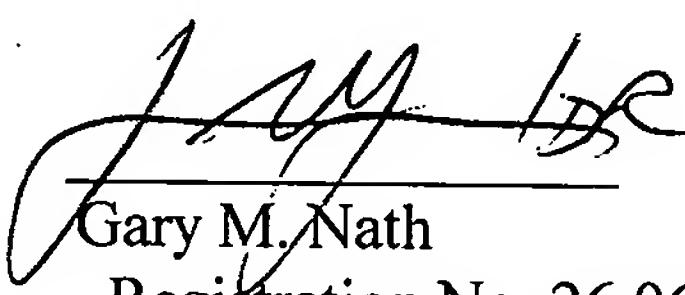
Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,
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March 13, 2008

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